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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/685,857	10/11/2000	Frank Kowalewski	10191/1575	4655

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EXAMINER	
VARTANIAN, HARRY	
ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/685,857	KOWALEWSKI ET AL.	
	Examiner	Art Unit	
	Harry Vartanian	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 October 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7/15/2004 have been fully considered but they are not persuasive. The applicant makes the following four key arguments regarding the prior art rejections:

i.) The Roux reference does not disclose determining the phases of the radio signals for each of the symbols to phase demodulate the radio signals.

ii.) The Roux reference does not show mapping a phase zone in accordance with a preestablished rule.

iii.) The Roux references does not disclose forming an average value from a preestablished number of the determined phases and determining a phase correction factor from the average value.

iv.) The Ohgoshi reference does not disclose determining the phases of the radio signals for each of the symbols such that the determined phases are mapped onto a phase zone in accordance with a pre-established rule.

In regards to argument i.), Roux states the use of radio signals. When modulating symbols, as in QAM, symbols are represented as signals with various phases and amplitudes. Therefor, the correction of a signal phase is synonymous with the phase correction of a symbol. Roux states that his phase correction system can be used in CDMA, which is well known to use symbols.

In regards to argument ii.), Roux states in Claim 1 and in Column 4, Lines 55-64 that after a signal is sampled, a predetermined function is used to narrow the phase shift into what can be considered a "zone" of "less than or equal to -.pi./(2x) but less than .pi.(2x),

where x is equal to 1 or 2 according to whether said input signal is real or complex". This is a "rule" that Roux uses to correct the phase shift of the signal.

In regards to argument iii.), Roux clearly states that once an average of the phase shifts is determined it is subtracted, i.e. corrected, from the despread signal(See Column 4, line 49 to Column 5, line 3).

In regards to argument iv.), the fact that Ohgoshi does not specifically meet the limitation of mapping into phase zones is moot since Roux is used as the primary reference to meet this limitation. Ohgoshi is used to meet the limitation of phase correcting by multiplying a signal, which a pilot qualifies as, by a phase correction factor.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claim 1, 2, 4, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roux(US Patent# 6,028,888) in view of Yamamoto further in view of Ohgoshi et al. In regards to Claim 1, Roux discloses a demodulation method to be used in multi-channel

communications in both a base station and mobile station using CDMA(Column 2, lines 13-58) that adjusts phase before detection(fig 2A). He also states that his method does not use pilot symbols for phase correction(Column 3, lines 6-16). Moreover, Roux meets the following limitations of Claim 1:

> code-despreading the radio signals transmitted from the base station; **(Column 4, Lines 36-37), Claim 1**
>
> determining the phases of the radio signals for each of the symbols to phase demodulate the radio signals; **(Column 4, Lines 49-51), Claim 1**
>
> mapping the determined phases onto a phase zone in accordance with a preestablished rule; **(Column 4, Lines 55-64), (Claim 1, Lines 54-61)**
>
> forming an average value from a preestablished number of the determined phases; **(Column 4, Lines 65-67), (Claim 2, lines 45-49)**
>
> determining a phase correction factor from the average value; and **(Column 5, lines 1-3), (Claim 2, lines 45-49)**

Roux fails to teach the use of predistorting the signal and multiplying the correction factor and radio signal in order to adjust the phase.

However, Yamamoto discloses "radio communication system for reducing deterioration of the transmission quality due to multipath fading while downsizing a terminal and reducing the power consumption. The propagation characteristic of a propagation path 3 is estimated by an automatic equalizer 30 set in a base station 1, and the inverse characteristic of the propagation path is added to the down-transmission data to be transmitted to a terminal 2 in a predistortion section 50 in accordance with the estimation result, and the data to which the inverse characteristic of the propagation path 3 is added is transmitted to the terminal 2 through the propagation path 3 as transmission data."(Abstract) Therefor it would have been obvious to those skilled in the art at the time the invention was made to use signal predistortion in Roux's demodulator. The motivation to combine disclosed by Yamamoto where he says that his system can "downsizing a terminal[mobile] and reducing the power consumption." Moreover, another motivation is

that it is well known in the art that predistortion is useful for reducing equalizer complexity in a mobile station.

Moreover, in regards to multiplying the correction factor and radio signal in order to adjust the phase Ohgoshi uses such an operation in adjusting the phase of his pilot symbol. Ohgoshi states:

> "In the phase correction circuit 30, for example as shown in FIG. 6, the I' and Q' components of delay data 29 outputted from the delay circuit 28 are multiplied respectively by the correction signals 24 of COS(φ) and SIN(φ) by ***multipliers 301A, 301B, 302A***, and 302B, and addition and subtraction are performed by an adder 303A and a subtractor 303B to ***correct the errors*** of the received data signal values caused by the phase shift. In this manner, the data despreading circuit 32 can demodulate received data signals (I, Q) 35."(Column 4, lines 35-43)

There is no substantial difference in removing the phase shift in pilot symbol versus that of the data symbol, since they are both just analog. Moreover, it is well known that trigonometric identity:

$$\sin(s)*\cos(t) = \tfrac{1}{2}*\sin(s+t) + \tfrac{1}{2}*\sin(s-t)$$

Therefor the phase shift can be corrected by multiplying a correction factor, which maybe a sinusoid or even an exponential if euler's formula is used. Therefor it would have been prima facie obvious for Roux to use Ohgoshi's phase correction multiplying step with Yamamoto's predistortion. The motivation to combine is that it is a mathematical operation that is commonly used in receivers, for example mixers, to alter phase and frequency in a sinusoid.

Regarding Claim 4, the rejection above meets all the limitations of the Claim.

Regarding Claims 2 and 5, Roux talks about scaling the average value:

> "means for multiplying said estimate of the phase shift or said average estimate of the phase shift by a predetermined scalar quantity to adjust the dynamic characteristics of said loop" **(Column 5, lines 35-40), Claim 4**

In regards to conjugating the average value, Roux implies this step in fig 2c where the average value is multiplied by −1 after integration. Multiplying by −1 is the same as multiplying by $e^{j\pi}$, which is one result of euler's identity.

1. Claims 3 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roux in view of Yamamoto further in view of Ohgoshi et al further in view of Rakib et al(US Patent #6,356,555). Roux, Yamamoto and Ohgoshi meet all the limitations of Claims 3 and 6-8 except the use of QAM in his communication system.

However, Rakib discloses the use of QAM in his wireless communication system. More specifically, Rakib discloses "each remote unit, after frame synchronization has been achieved by that remote unit, modulating the n elements of each said inphase and quadrature result vectors onto two radio frequency carriers of the same frequency but offset in phase by 90 degrees using QAM modulation, said radio frequency carriers being synchronized in frequency to a master carrier in said central unit."(Claim 6) Therefor it would have been obvious to those skilled in the art at the time the invention was made to use QAM in Roux, Yamamoto and Ohgoshi's communication system. The motivation to combine is that in comparison to QPSK, QAM results in higher throughput when more than 4 points are used in a constellation.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no

event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 571.272.3048. The examiner can normally be reached on 10:00-6:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571.272.3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry Vartanian
Examiner
Art Unit 2634

HV

STEPHEN CHIN
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